

**REMARKS**

Prior to entry of this amendment, claims 1-17 are currently pending in the subject application.

Applicants appreciate the Examiner's acknowledgement of Applicants' claim for foreign priority and receipt of a certified copy of the priority document.

Claims 1-17 are presented to the Examiner for further prosecution on the merits.

**A. Introduction**

In the outstanding Office action, the Examiner rejected claims 1, 4, and 6 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Publication No. 2003/0209431 to Brown ("the Brown reference"), rejected claims 2 and 3 under 35 U.S.C. §103(a) as being unpatentable over the Brown reference in view of U.S. Patent Publication No. 2003/0019739 to Shibamoto et al. ("the Shibamoto et al. reference"), rejected claims 5 under 35 U.S.C. §103(a) as being unpatentable over the Brown reference in view of U.S. Patent No. 4,904,362 to Gaertner et al. ("the Gaertner et al. reference"), rejected claims 7, 11, 13 and 17 under 35 U.S.C. §103(a) as being unpatentable over Applicants' admitted prior art, Fig. 1 ("AAPA"), in view of the Brown reference, rejected claims 8-10 and 14 under 35 U.S.C. §103(a) as being unpatentable over AAPA in view of the Brown reference as applied to claim 7 above, and further in view of the Shibamoto et al. reference, rejected claim 12 under 35 U.S.C. §103(a) as being unpatentable over AAPA in view of the Brown reference as applied to claim 7 above, and further in view of the Gaertner et al. reference, rejected claim 16 under 35 U.S.C. §103(a) as being unpatentable over AAPA in view of the Brown reference as applied to claim 7 above, and further in view of U.S. Patent No. 5,171,411 to Hillendahl et al. ("the Hillendahl reference").

B. Specification

Applicants have amended the Specification at paragraph [0016] to correct a minor typographical error. No new matter and no new issues are raised by way of this amendment to the specification.

C. Objections to Drawings

The Examiner has objected to the drawings as failing to comply with MPEG §608.02(g). Specifically, the Examiner stated that FIGS. 1-4 should be designated by legends as –Prior Art–.

Responsive to the objection, Applicants have amended the drawings as suggested by the Examiner. Specifically, the legend –Prior Art– has been added to designate each of FIGS. 1-4. A set of replacement drawings including FIGS. 1-4, as amended, is attached following page 21 of this paper.

Therefore, Applicants contend that drawings as they are presented now fully satisfy the requirements of MPEG §608.02(g). As such, Applicants respectfully request the objections to the drawings be withdrawn.

D. Asserted Anticipation Rejection of Claims 1, 4, and 6

In the outstanding Office action, the Examiner rejected claims 1, 4, and 6 under 35 U.S.C. § 102(e) as being anticipated by the Brown reference. The rejection is respectfully traversed.

Applicants have amended claims 1, 4, and 6 to more clearly recite aspects of the invention. Support for the amendment can be found in the Specification at paragraphs [0050], [0054], and [0056] and FIGS. 5, 6A-6B, and 7. Independent claim 1, as amended, recites limitations not taught, shown, or suggested by the Brown reference.

The Brown reference teaches a magnetron sputtering cathode 21 having magnet arrays (correspond to Applicants' "magnet units") 50, 52, and 54, which are disposed on a magnet base 44 opposing a sputtering target 56. Each of the magnet arrays 50, 52, and 54 is formed using component magnets 70. The magnet arrays 52 and 54 are disposed around the magnet array 50. The north pole N of the magnet array 50 and south poles S of the peripheral magnet arrays 52 and 54 are positioned adjacent to the magnet base 44 (paragraphs [0013], [0036]-[0037], and [0040]; FIGS. 3-4 and 6), and, as such, oppose each other.

The Examiner's attention is directed to the fact that the Brown reference specifically teaches the magnetron sputtering cathode where like poles of the magnets in the peripheral magnet arrays 52 and 54 are oriented in the same direction, which is opposite to the direction of orientation of the poles of the magnets in the magnet array 50. For example, as shown in FIGS. 3-4 and recited in paragraphs [0013], [0036]-[0037], and [0040], the north poles N (i.e., like poles) of magnets in the magnet arrays 52 and 54 are directed towards the magnet base 44, whereas the north pole(s) N of magnet(s) in the magnet array 50 are oriented in the opposite direction towards the sputtering target 56.

In contrast, in Applicants' invention, like magnetic poles of magnets disposed in adjacent magnet units 35a, 35b, and 35c are oriented in the opposite directions, as shown in Applicants' FIGS. 5, 6A-6B, and 7. Specifically, like magnetic poles of magnets in peripheral magnet units 35b and 35c are oriented in the opposite directions.

In fact, in reference to the orientation of like magnetic poles of magnets in the peripheral magnet units (i.e., Applicants' magnet units 35b, and 35c and the magnet units 52 and 54 of the Brown reference), the Brown reference teaches away from the Applicants' invention.

Specifically, the Brown reference does not teach, show, or suggest a magnetron cathode comprising a first magnet unit and at least two peripheral magnet units selectively disposed around the first magnet unit, where each magnet unit of the first and peripheral magnet units includes at least one magnet, and in adjacent magnetic units like magnetic poles of the at least one magnet are oriented in opposite directions, as recited in claim 1.

In view of the above-mentioned distinction between the teachings of the cited reference and the subject invention, the Brown reference does not teach Applicants' invention of claim 1.

Furthermore, claims 4 and 6 depend, either directly or indirectly, from claim 1 and recite additional features therefor. Since the Brown reference would not produce Applicants' invention as recited in claim 1, dependent claims 4 and 6 are also not obvious and are allowable.

Thus, Applicants submit that claims 1, 4, and 6 are patentable over the Brown reference. Accordingly, reconsideration and withdrawal of the rejections of claims 1, 4, and 6 are respectfully requested.

E. Asserted Obviousness Rejection of Claims 2 and 3

In the outstanding Office action, the Examiner rejected claims 2 and 3 under 35 U.S.C. § 103(a) as being unpatentable over the Brown reference in view of the Shibamoto et al. reference. The rejection is respectfully traversed.

Applicants have amended claim 1, from which claims 2 and 3 depend, and amended claims 2 and 3 to more clearly recite aspects of the invention.

Independent claim 1, as amended, recites limitations not taught, shown, or suggested by a combination of the alleged references. The patentability of claim 1 over the Brown reference has been discussed above in Section D.

The Shibamoto et al. reference teaches a sputtering apparatus having a plurality of magnetron units (correspond to Applicants' "magnetron cathodes") 3 each including a magnet assembly 5. The magnet assembly 5 comprises a central magnet 51 and a (single) peripheral magnet (corresponds to Applicants' "magnet unit") 52, which is disposed around the central magnet 51 (paragraphs [0035]-[0036]; FIGS 4 and 11). The Shibamoto et al. reference does not teach magnetron units including more than one peripheral magnet 52.

As such, the Shibamoto et al. reference does not teach Applicants' magnetron cathode comprising a first magnet unit and at least two peripheral magnet units (i.e., at least three magnet units), where the peripheral magnet units are selectively disposed around the first magnet unit, as recited in claim 1. Correspondingly, the Shibamoto et al. reference does not teach specific orientation of like poles of magnets in the peripheral magnet units of such a magnetron cathode. Therefore, the Shibamoto et al. reference does not teach Applicants' invention, and claim 1 is patentable over the Shibamoto et al. reference.

Specifically, none of the alleged references, alone or in a combination, teaches a magnetron cathode comprising a first magnet unit and at least two peripheral magnet units selectively disposed around the first magnet unit, where each magnet unit of the first and peripheral magnet units includes at least one magnet, and in adjacent magnetic units like magnetic poles of the at least one magnet are oriented in opposite directions, as recited in claim 1.

Moreover, the Shibamoto et al. reference cannot be utilized to modify the teachings of the Brown reference in a manner that would result in the Applicants' magnetron cathode recited in claim 1. As such, a combination of the Brown reference and the Shibamoto et al. reference would not produce Applicants' invention of claim 1.

Furthermore, claims 2 and 3 depend directly from claim 1 and recite additional features therefor. Since a combination of the alleged references would not produce Applicants' invention recited in claim 1, dependent claims 2 and 3 are also not obvious and are allowable.

As such, Applicants submit that claims 2 and 3 are patentable over the Brown reference in view of the Shibamoto et al. reference. Accordingly, reconsideration and withdrawal of the rejections of claims 2 and 3 are respectfully requested.

F. Asserted Obviousness Rejection of Claim 5

In the outstanding Office action, the Examiner rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over the Brown reference in view of the Gaertner et al. reference. The rejection is respectfully traversed.

Applicants have amended claim 1, from which claim 5 depends, and amended claim 5 to more clearly recite aspects of the invention.

Independent claim 1, as amended, recites limitations not taught, shown, or suggested by a combination of the alleged references. The patentability of claim 1 over the Brown reference has been discussed above in Section D.

The Gaertner et al. reference teaches a bar-shaped magnetron cathode 6 adapted for a tubular target. The magnetron cathode 6 comprises a single tube-shaped magnet unit having a plurality of magnets 31 stacked on a hollow shaft 30 (col. 5, lines 13-16; FIG. 2). The Gaertner et al. reference does not teach a magnetron cathode having more than one magnet unit.

As such, the Gaertner et al. reference does not teach Applicants' magnetron cathode comprising a first magnet unit and at least two peripheral magnet units (i.e., at least three magnet units), where the peripheral magnet units are selectively disposed around the first magnet unit, as recited in claim 1. Therefore, Applicants' claim 1 is patentable over the Gaertner et al. reference

for at least the same reasons as discussed above in Section E with respect to the Shibamoto et al. reference.

Specifically, none of the alleged references, alone or in a combination, teaches a magnetron cathode comprising a first magnet unit and at least two peripheral magnet units selectively disposed around the first magnet unit, where each magnet unit of the first and peripheral magnet units includes at least one magnet, and in adjacent magnetic units like magnetic poles of the at least one magnet are oriented in opposite directions, as recited in claim 1.

Moreover, the Gaertner et al. reference cannot be utilized to modify the teachings of the Brown reference in a manner that would result in the Applicants' magnetron cathode recited in claim 1. As such, a combination of the Brown reference and the Gaertner et al. reference would not produce Applicants' invention as claimed in claim 1.

Furthermore, claim 5 depends directly from claim 1 and recites additional features therefor. Since a combination of the alleged references would not produce Applicants' invention recited in claim 1, dependent claim 5 is also not obvious and is allowable.

As such, Applicants submit that claim 5 is patentable over the Brown reference in view of the Gaertner et al. reference. Accordingly, reconsideration and withdrawal of the rejections of claim 5 are respectfully requested.

G. Asserted Obviousness Rejection of Claims 7, 11, 13, and 17

In the outstanding Office action, the Examiner rejected claims 7, 11, 13, and 17 under 35 U.S.C. § 103(a) as being unpatentable over AAPA in view of the Brown reference. The rejection is respectfully traversed.

Applicants have amended claims 7, 11, 13, and 17 to more clearly recite aspects of the invention. Independent claim 7, as amended, recites limitations not taught, shown, or suggested by a combination of the alleged references.

The patentability of claim 1 over the Brown reference has been discussed above in Section D. Claims 1 and 7 recite similar subject matter and, as such, claim 7 is patentable over the Brown reference for at least the same reasons as discussed in Section D with respect to the patentability of claim 1.

AAPA teaches a magnetron sputtering apparatus where a magnetron cathode comprises a central magnet and a plurality of magnets 15 forming, together, a single peripheral magnet unit, which is disposed around the central magnet (Applicants' FIG. 1). AAPA does not teach the magnetron cathode having more than one peripheral magnet unit. Since claims 1 and 7 recite similar subject matter, Applicants' claim 7 is patentable over AAPA for at least the same reasons as discussed above in Section E with respect to the patentability of claim 1 over the Shibamoto et al. reference.

Specifically, none of the alleged references, alone or in a combination, teaches a magnetron sputtering apparatus including a magnetron cathode having a first magnet unit and at least two peripheral magnet units selectively disposed around the first magnet unit, where each magnet unit of the first and peripheral magnet units includes at least one magnet, and in adjacent magnetic units like magnetic poles of the at least one magnet are oriented in opposite directions, as recited in claim 7.

Moreover, the Brown reference cannot be utilized to modify the teachings of AAPA in a manner that would result in the Applicants' sputtering apparatus recited in claim 7. As such, a



combination of AAPA and the Brown reference would not produce Applicants' invention of claim 7.

Furthermore, claims 11, 13, and 17 depend directly from claim 7 and recite additional features therefor. Since a combination of the alleged references would not produce Applicants' invention recited in claim 7, dependent claims 11, 13, and 17 are also not obvious and are allowable.

As such, Applicants submit that claims 7, 11, 13, and 17 are patentable over AAPA in view of the Brown reference. Accordingly, reconsideration and withdrawal of the rejections of claims 7, 11, 13, and 17 are respectfully requested.

H. Asserted Obviousness Rejection of Claims 8-10 and 14

In the outstanding Office action, the Examiner rejected claims 8-10 and 14 under 35 U.S.C. § 103(a) as being unpatentable over AAPA in view of the Brown reference as applied to claim 7 above and further in view of the Shibamoto et al. reference. The rejection is respectfully traversed.

Applicants have amended claim 7, from which claims 8-10 and 14 depend, and amended claims 8-10 and 14 to more clearly recite aspects of the invention.

Independent claim 7, as amended, recites limitations not taught, shown, or suggested by a combination of the alleged references. The patentability of claim 7 over AAPA and the Brown reference has been discussed above in Section G. Claim 7 is also patentable over the Shibamoto et al. reference for at least the same reasons as discussed above in Section E with respect to the patentability of claim 1 over that reference.

Specifically, none of the alleged references, alone or in a combination, teaches a magnetron sputtering apparatus including a magnetron cathode having a first magnet unit and at

least two peripheral magnet units selectively disposed around the first magnet unit, where each magnet unit of the first and peripheral magnet units includes at least one magnet, and in adjacent magnetic units like magnetic poles of the at least one magnet are oriented in opposite directions, as recited in claim 7.

Moreover, the Brown and Shibamoto et al. references cannot be utilized to modify the teachings of AAPA in a manner that would result in the Applicants' magnetron sputtering apparatus recited in claim 7. As such, a combination of AAPA, the Brown reference, and the Shibamoto et al. reference would not produce Applicants' invention of claim 7.

Furthermore, claims 8-10 and 14 depend, either directly or indirectly, from claim 7 and recites additional features therefor. Since a combination of the alleged references would not produce Applicants' invention recited in claim 7, dependent claims 8-10 and 14 are also not obvious and are allowable.

As such, Applicants submit that claims 8-10 and 14 are patentable over AAPA in view of the Brown reference and the Shibamoto et al. reference. Accordingly, reconsideration and withdrawal of the rejections of claims 8-10 and 14 are respectfully requested.

I. Asserted Obviousness Rejection of Claim 12

In the outstanding Office action, the Examiner rejected claim 12 under 35 U.S.C. § 103(a) as being unpatentable over AAPA in view of the Brown reference as applied to claim 7 above and further in view of the Gaertner et al. reference. The rejection is respectfully traversed.

Applicants have amended claim 7, from which claim 12 depends, and amended claim 12 to more clearly recite aspects of the invention.

Independent claim 7, as amended, recites limitations not taught, shown, or suggested by a combination of the alleged references. The patentability of claim 7 over AAPA and the Brown

reference has been discussed above in Section G. Claim 7 is also patentable over the Gaertner et al. reference for at least the same reasons as discussed above in Section F with respect to the patentability of claim 1 over that reference.

Specifically, none of the alleged references, alone or in a combination, teaches a magnetron sputtering apparatus including a magnetron cathode having a first magnet unit and at least two peripheral magnet units selectively disposed around the first magnet unit, where each magnet unit of the first and peripheral magnet units includes at least one magnet, and in adjacent magnetic units like magnetic poles of the at least one magnet are oriented in opposite directions, as recited in claim 7.

Moreover, the Brown and Gaertner et al. references cannot be utilized to modify the teachings of the AAPA in a manner that would result in the Applicants' magnetron sputtering apparatus recited in claim 7. As such, a combination of AAPA, the Brown reference, and the Gaertner et al. reference would not produce Applicants' invention as claimed in claim 7.

Furthermore, claim 12 depends directly from claim 7 and recites additional features therefor. Since a combination of the alleged references would not produce Applicants' invention recited in claim 7, dependent claim 12 is also not obvious and is allowable.

As such, Applicants submit that claim 12 is patentable over AAPA in view of the Brown reference and the Gaertner et al. reference. Accordingly, reconsideration and withdrawal of the rejections of claim 12 are respectfully requested.

J. Asserted Obviousness Rejection of Claim 16

In the outstanding Office action, the Examiner rejected claim 16 under 35 U.S.C. § 103(a), as being unpatentable over AAPA in view of the Brown reference as applied to claim 7

above, and further in view of the Hillendahl et al. reference. The rejection is respectfully traversed.

Applicants have amended claim 7, from which claim 16 depends, and amended claim 16 to more clearly recite aspects of the invention. Independent claim 7, as amended, recites limitations not taught, shown, or suggested by a combination of the alleged references. The patentability of claim 7 over AAPA and the Brown reference has been discussed above in Section G.

The Hillendahl et al. reference teaches a cylindrical magnetron cathode 14 having an elongated magnet assembly 18. The assembly 18 includes three magnetic poles 24, 26, and 28 disposed around a circumference of a cylinder 16 and forming a magnetic tunnel (FIG. 1, col. 3, lines 31-59). The Hillendahl et al. reference does not teach a magnetron sputtering apparatus having a magnetron cathode having peripheral magnet units selectively disposed around a central (or "first") magnet unit, as recited in claim 7. Correspondingly, the Hillendahl et al. reference does not teach specific orientation of the poles of magnets in the peripheral magnet units of such a magnetron cathode. Therefore, the Hillendahl et al. reference does not teach Applicants' invention, and claim 7 is patentable over the Hillendahl et al. reference.

Specifically, none of the alleged references, alone or in a combination, teaches a magnetron sputtering apparatus including a magnetron cathode having a first magnet unit and at least two peripheral magnet units selectively disposed around the first magnet unit, where each magnet unit of the first and peripheral magnet units includes at least one magnet, and in adjacent magnetic units like magnetic poles of the at least one magnet are oriented in opposite directions, as recited in claim 7.

Moreover, the Brown and Hillendahl et al. references cannot be utilized to modify the teachings of AAPA in a manner that would result in the Applicants' magnetron sputtering apparatus recited in claim 7. As such, a combination of AAPA, the Brown reference, and the Hillendahl et al. reference would not produce Applicants' invention of claim 7.

Furthermore, claim 16 depends indirectly from claim 7 and recites additional features therefor. Since a combination of the alleged references would not produce Applicants' invention recited in claim 7, dependent claim 16 is also not obvious and is allowable.

As such, Applicants submit that claim 16 is patentable over AAPA in view of the Brown reference and the Hillendahl et al. reference. Accordingly, reconsideration and withdrawal of the rejections of claim 12 are respectfully requested.

K. Allowable Subject Matter

The Examiner has objected to dependent claim 15 as being dependent upon a rejected base claim, but indicated that it would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants thank the Examiner for indicating allowable subject matter, but believe that independent claim 7, from which claim 15 depends, is allowable over the prior art of record for the reasons set forth above. Thus, Applicants contend that claim 15, as amended, should distinguish over the prior art of record and respectfully request allowance of claim 15.

L. Conclusion

Applicants submit that all claims now pending in the subject application are in condition for allowance.

The remaining documents cited by the Examiner were not relied on to reject the claims. Therefore, no comments concerning these documents are considered necessary at this time.

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing amendments and remarks, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all the claims is hereby requested.

Respectfully submitted,

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Date: December 12, 2005

  
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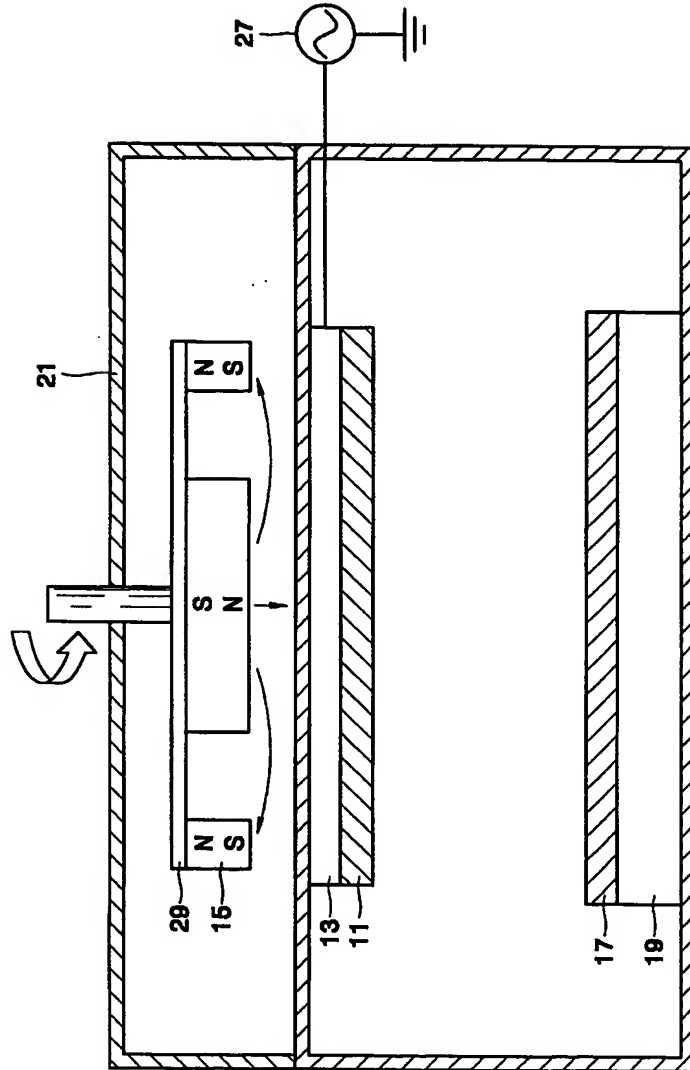
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If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.



FIG. 1



PRIOR ART



FIG. 2

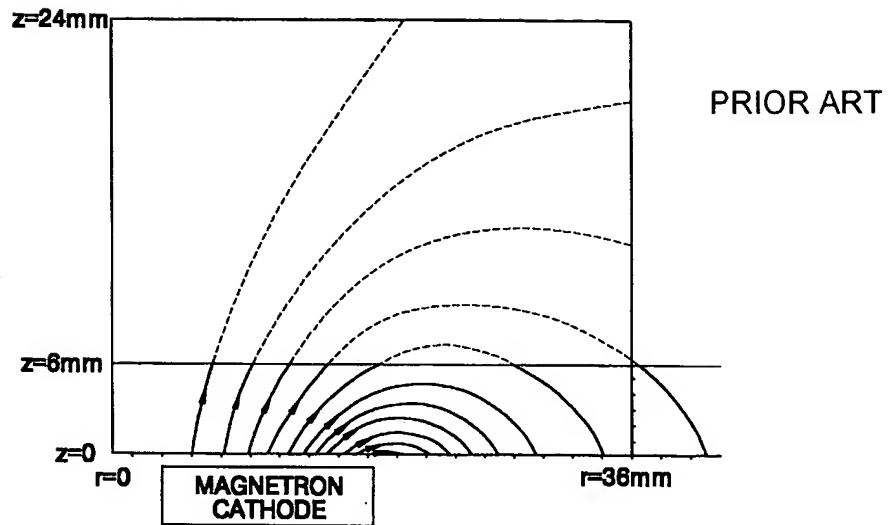


FIG. 3

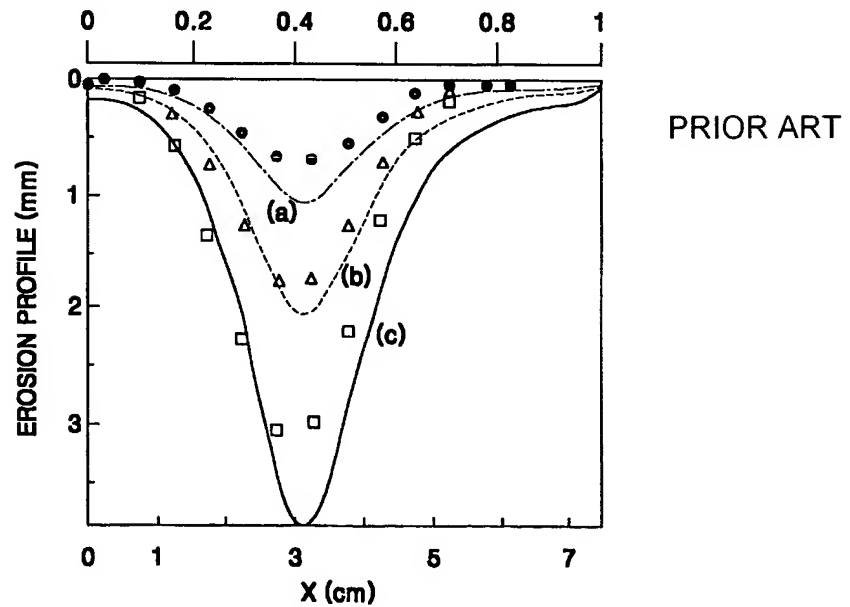






FIG. 4

PRIOR ART

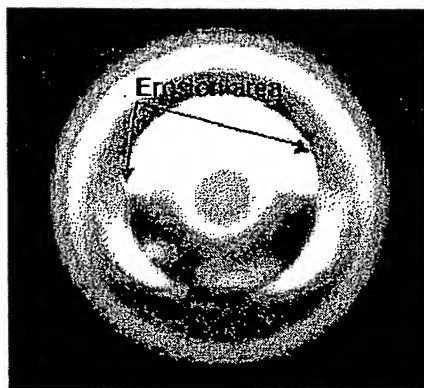
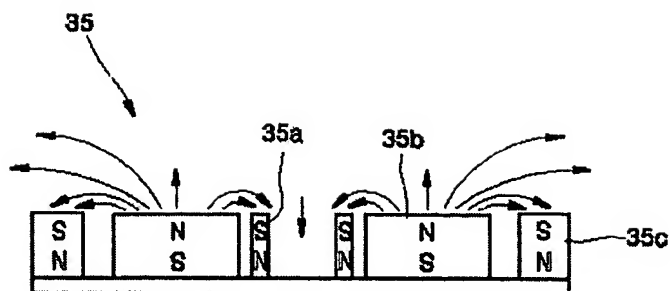


FIG. 5



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